KOLLMORGEN

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High frequency inverter
ACO5000 by ACOMEL

WINDOW's Programming Software
USER MANUAL

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Solutions by DANAHER MOTION

20-06-08 **S620-gb-0825**

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This manual is valid from Firmware version 1.50 and Software version 3.1

Software installation

With this manual you received a CD rom containing:

1. **Root**
   - **Driver USB**
   - This driver must be installed before the installation of the window software.

2. **Folder WinSoft**
   - The operating software described in this manual
   - To install, just open the folder and double click on the file SETUP
   - Follow the instructions on the screen

3. **Folder Manuals**
   - PDF file of this user manual
   - PDF file of the hardware user manual

4. **Compatibility**
   - This software is compatible Win98, Win2000 and WinXP

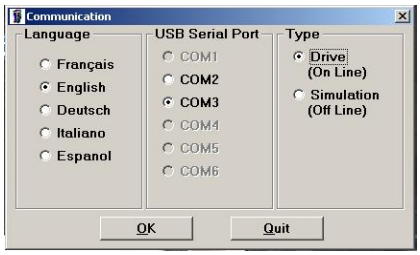
5. **Connection**
   - High quality UNIVERSAL SERIAL BUS 2.0 cable
   - Foil and drain wire shielded
   - Standard connectors A and B
   - Available from Danaher Motion on request

The software windows

Communication set-up

The communication is using the USB port.
The protocol is automatically defined by the software.

The communication window

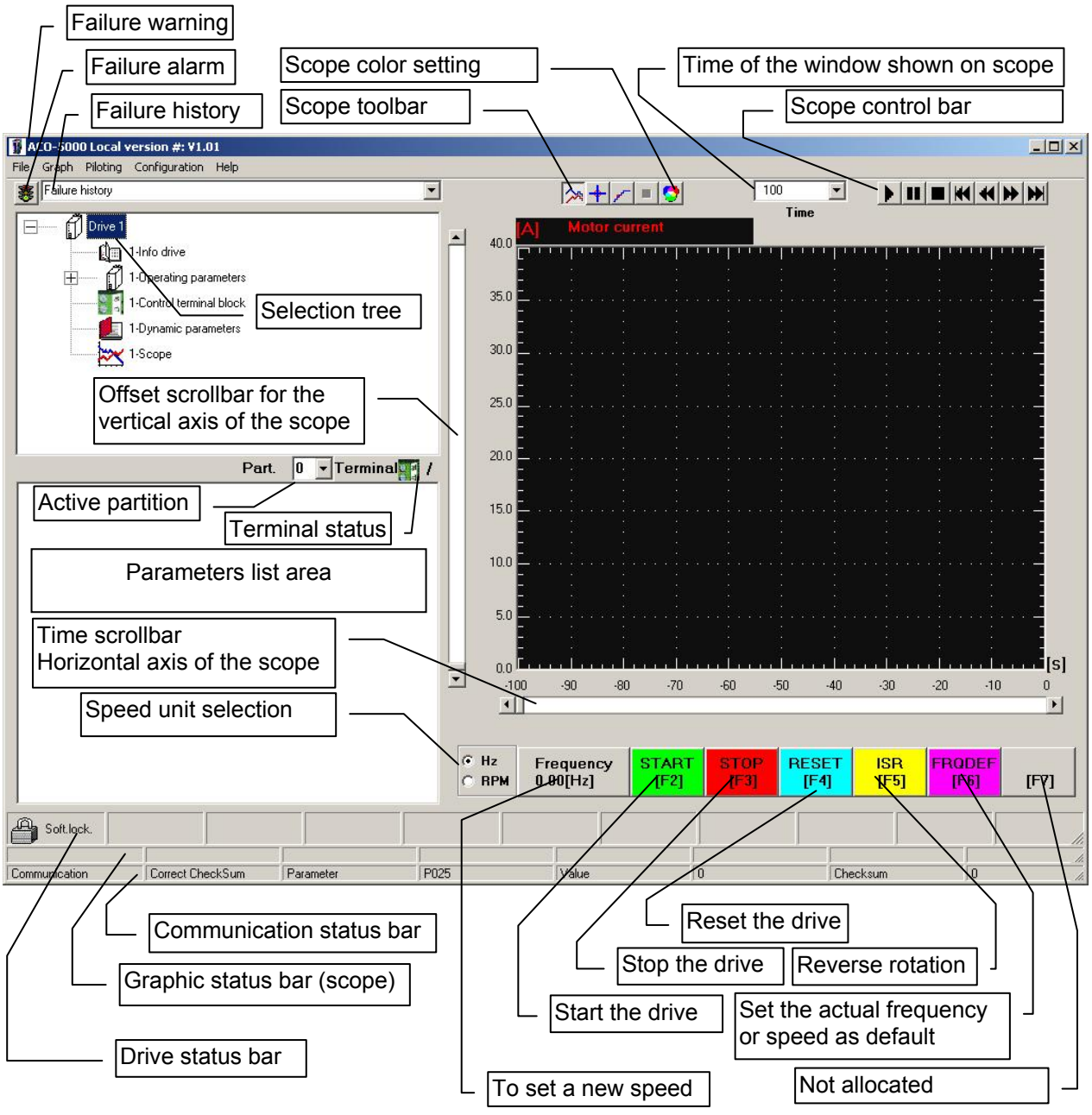


Used for language selection.
You have the possibility to select the simulation mode to make a demo of the way this software is operating. Doing it you will see the this window simulating the drive operation.

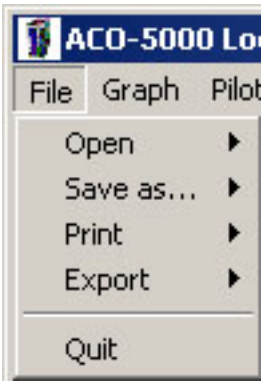
Active **only** in simulation mode. **No connection** to the drive, even if the USB cable is connected.

CAUTION: "DRIVE" MUST BE ACTIVED TO HAVE A CONNECTION TO THE DRIVE

The opening window



The File menu

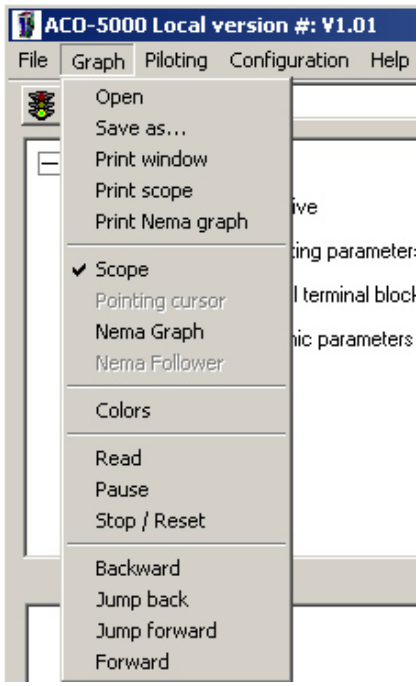


To open stored data or to save the drive data.

CAUTION: when you open a set of stored parameters, those data will be automatically downloaded to the selected drive, replacing the existing ones.

- **Open, Save** and **Print** drive parameters relate to the **Operating parameters AND Partition parameters of all partitions.**
- **Export** the programmed parameters as text file

The Graph menu



Some functions are also available from the **Scope toolbar** and the **Scope control bar.**

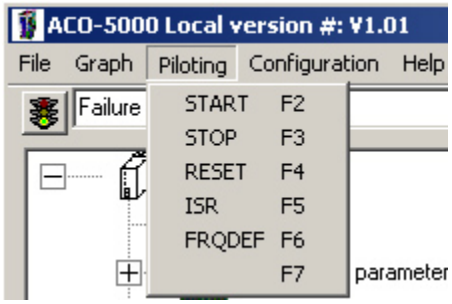
Open a file of previous saved scope recorded data
Save as … store the recorded scope data
Print window print the entire window
Print scope print only the graphs shown in the scope area
Print Nema graph to print the Nema only

Scope to select display of scope function
Pointing cursor available only if data are displayed on scope
Nema graph display the Nema in the scope area
Nema follower a dot is displayed at the working point
Colors: Graph colors setup

Read the recorded scope data
Pause the reading
Stop the reading / **Reset** clears the recorded data

Read **Backward**
Jump back to the beginning of the recording
Jump forward to the end of the recording
Read **Forward**

The Piloting menu



Menu "Piloting" and the available "piloting toolbar" underneath the scope, have identical functions.

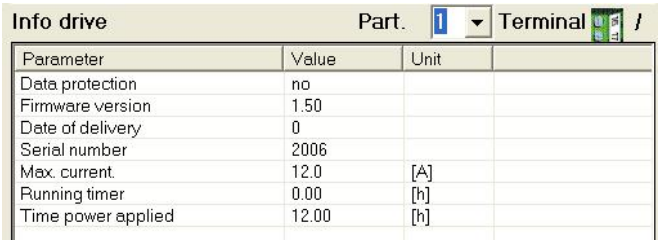
START the selected drive
STOP the selected drive
RESET after a failure
ISR reverse the direction of rotation
FREQDEF set the actual frequency as default frequency

The Configuration menu

To modify your passwords.

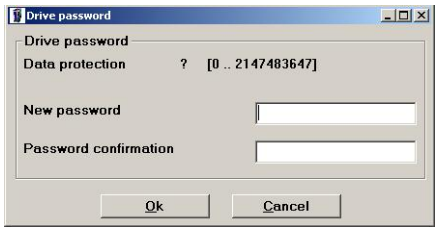
Partition password protects your motors parameters set against modification

The drive information



In case of allocation of the partition selection to the terminal block, the "Green icon" right to "Terminal" turns "Red" if the selected partition on the terminals doesn't match the one selected right to "Part."

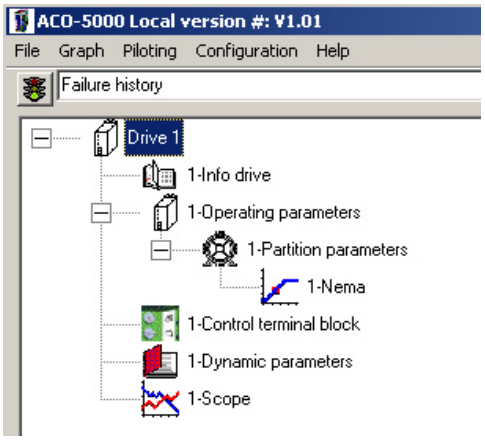
Display	Description	Values
Data protection	The password must be numerical (no letter)	***Yes*** *or* ***No***



This password is set by the spindle manufacturer if he want to hide the set of motor data (motor data and Nema). If this password is set and you need it, please contact your machine or spindle supplier. If you don't have it and like to continue, you can reset the drive.
Caution: All programmed data will be

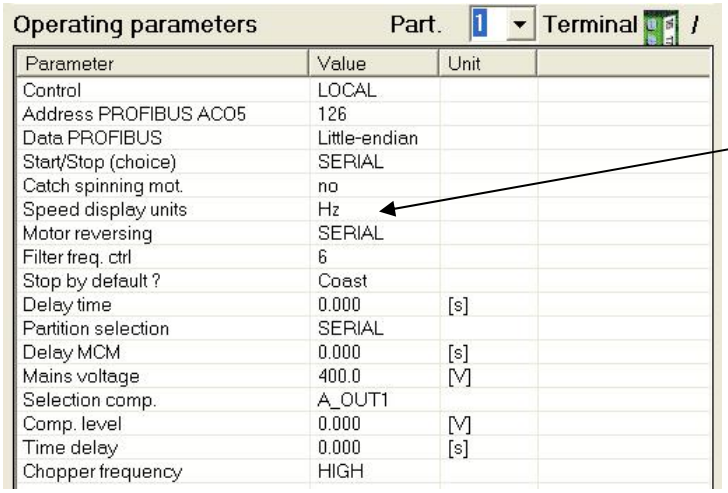
Firmware version	Release number of the installed software. In case of programming problems, please indicate this number when calling our customer support.	**x.xx**
Date of delivery	Shipping date of the unit. This is the date the unit left our manufacturing plant in Switzerland.	**yyyymmdd**
Serial number	Specific to each unit. Format yy (year) followed by ww (week) and nnnn (incremental number during the week. **Note:** until year 2010, the year will have only one digit.	**yywwnnnn**
Max. current. (A)	Display the maximum output current of the inverter. This parameter is related to the drive rating and is used to protect the drive in overload conditions as well short circuit between phases and phase to ground.	**ACO5005D : 7.5 A** **ACO5008D : 12 A** **ACO5012D : 18 A** **ACO5020D : 30 A**
Running timer	Cumulated time in START mode	**0.00 [H]**
Time power applied	Cumulated time input voltage ON	**0.00 [H]**

The selection tree

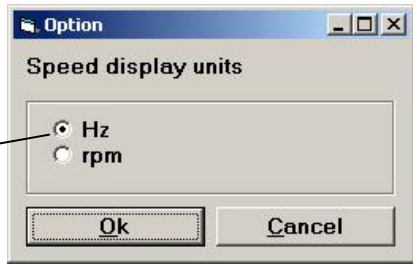


This selection tree is repeated for each connected drive, up to max. 4

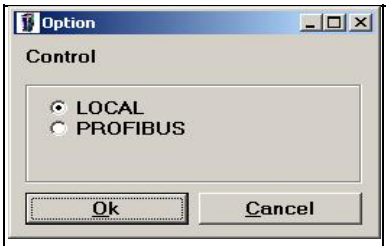
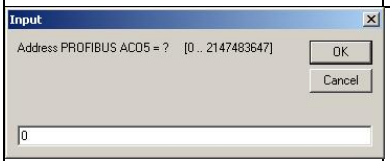
The operating parameters

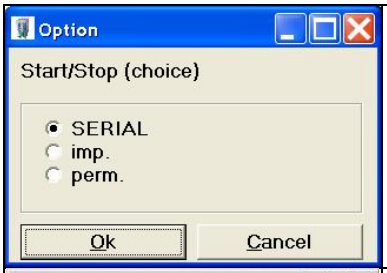
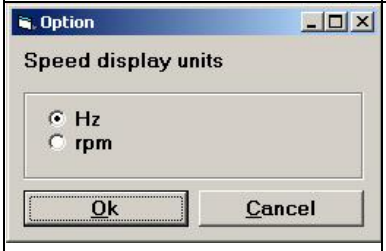
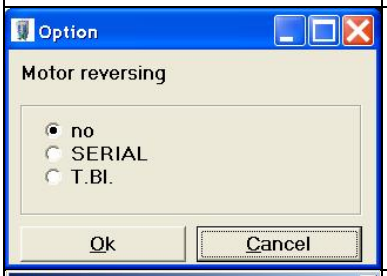
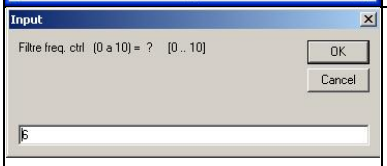
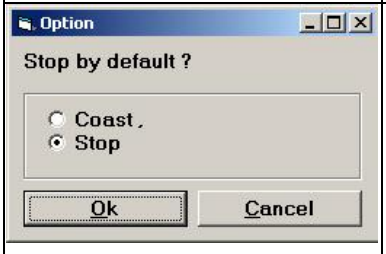
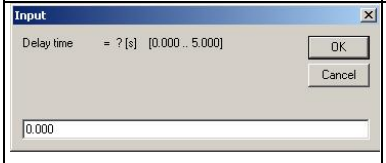


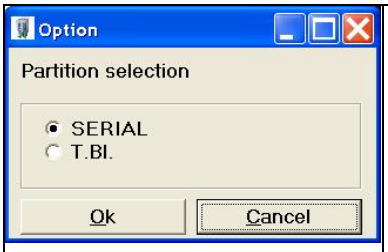
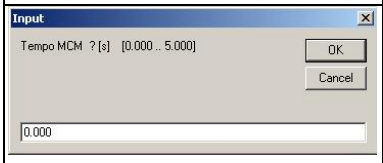
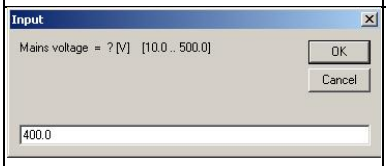
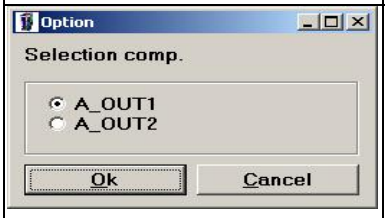
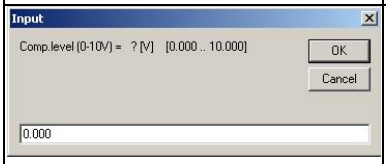
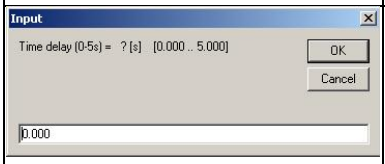
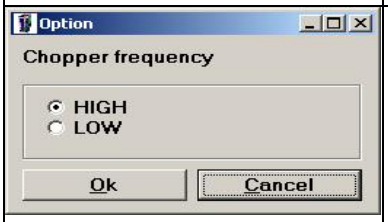
Parameter	Value	Unit
Control	LOCAL	
Address PROFIBUS ACO5	126	
Data PROFIBUS	Little-endian	
Start/Stop (choice)	SERIAL	
Catch spinning mot.	no	
Speed display units	Hz	
Motor reversing	SERIAL	
Filter freq. ctrl	6	
Stop by default ?	Coast	
Delay time	0.000	[s]
Partition selection	SERIAL	
Delay MCM	0.000	[s]
Mains voltage	400.0	[V]
Selection comp.	A_OUT1	
Comp. level	0.000	[V]
Time delay	0.000	[s]
Chopper frequency	HIGH	



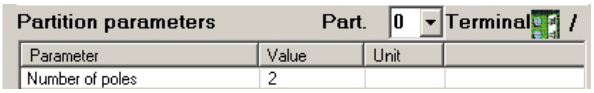
To modify a parameter, just double click or hit ENTER on the selected line

	Selection of the control mode of the drive. ⇒ **LOCAL** means you can operate the drive either through the terminal bloc, the remote keypad or the connected PC. ⇒ **PROFIBUS** allocated the full control to the field bus. No control or data change via the PC is possible. Only the oscillograph window is available on the PC screen. To go back to **LOCAL** control, just click on the bar "**PROFIBUS**" underneath the oscillograph screen and answer "YES" to the question.
	To set the PROFIBUS address of the drive. This value depends from your Profibus configuration. For further information see our specific Profibus user manual.
	Configuration of the Profibus data. This value depends from your Profibus configuration. For further information see our specific Profibus user manual.

	Function can be assigned to: • **SERIAL** means to USB or dedicated keypad TL5 • **imp** means impulse signal to START and STOP terminals • **perm** means permanent contact to START terminal. By **SERIAL** and **perm** selection, a permanent 24 VDC signal must be applied to the STOP terminal.
	When this function is activated, it is possible to catch a spinning motor and to accelerate it back to the set speed. ***This function is not available on firmware version 1.50*** ***If you need it please contact us.***
	Here you pre-set the displayed units for the speed i.e. Hz or RPM. The number of poles of the motor will be taken into consideration automatically. This parameter is also available in the main window.
	If you want to lock any reversing of the rotating direction of the motor you can do it here by entering **no**. If you allow the reversing, the function can be assigned to: **SERIAL** means to USB or dedicated keypad TL5 **T.BI.** means to Control terminals in the drive front. One digital input must be allocated to the function.
	Input here a filter value for the analogue speed reference input. This factor is needed to smooth speed variations due to signal noise. Value **0** to **10**
	For all non-destructive failures where the STOP can be monitored, like: Converter temperature, External Interlocks, …. We can choose between 2 ways of stopping the motor: • Coast to rest • Braking down using the deceleration's ramp
	For all non-destructive failure where the turn off can be delayed, like Converter temperature, External Interlocks, Motor temperature, … a delay time of 0 to 5 s can be input here. This function is to allow the CNC to monitor the machine motion before the converter trips.

	At this step you decide the way you want to select the active partition Function can be assigned to: • **SERIAL** means to USB or dedicated keypad TL5 • **T.BI** means to Control terminals in the drive front. The required number of programmable digital inputs must be allocated to this selection. The partition No 0 is **not** available by T.BI
	Internal timer which can be set from 0 to 5 s. This is a delay between the frequency (speed) reached information and the enable of the MCM function in order to let time to the rotor speed to stabilize.
	Enter here the nominal value in V, of the voltage of your power supply. Input value between 200 and 480 V. All mains voltages between 170 VAC and 530 VAC are considered being inside of the tolerances.
	A value allocated to one of the A_OUT1 or A_OUT2 can be internally compared to a define voltage level (0 to 10 VDC) set in the next step. Once this level is reached or exceeded an alarm can be triggered after a set delay time.
	Definition of the comparison level. Set a value between 0 and 10 VDC
	Time delay to trigger the alarm once the comparison level above has been reached or exceeded. This function must be allocated to one of the digital outputs OUT1 to OUT4.
	To set the operating frequency of the intermediate DC-bus chopper. For standard application, always use "HIGH". If the ambient temperature is high, or if you experience repeated drive failure with the message "Converter temperature too high", set this frequency to "LOW".

The partition selection



To select your partition use "Part." in the this window. When the partition selection is set to the Terminal Block, if the partition selected in this widow doesn't match the one of the terminal block, the icon right of "Terminal" will turn red.

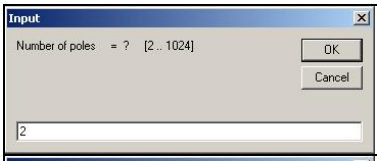
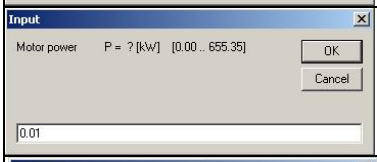
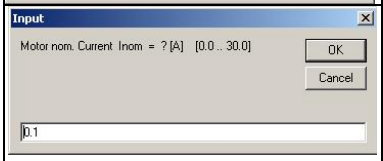
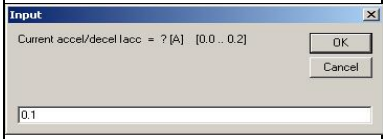
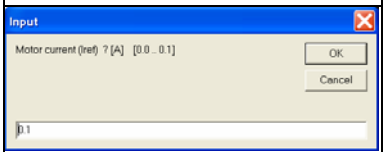
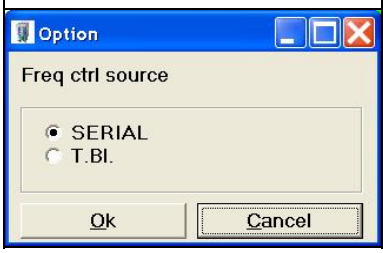
The partition parameters

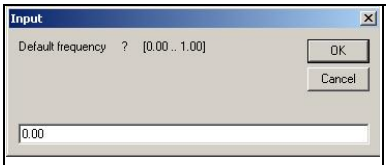
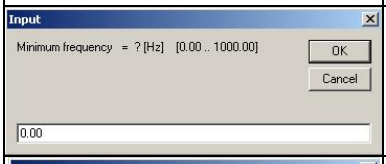
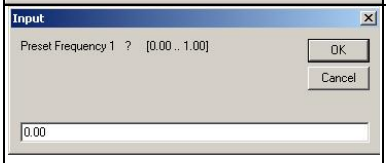
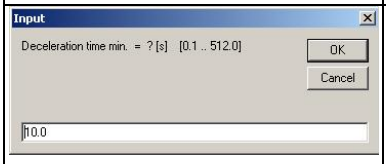
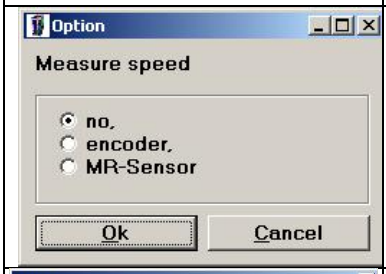
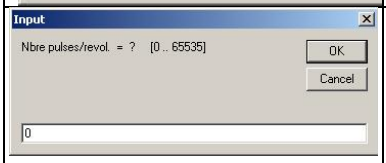
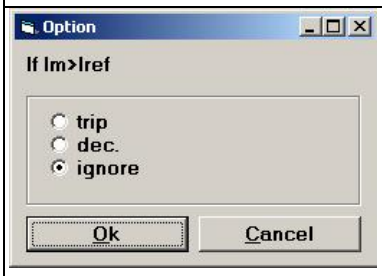
Partition parameters Part. 1 Terminal /

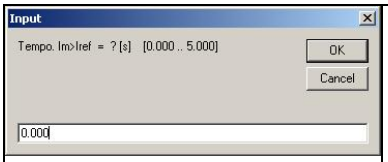
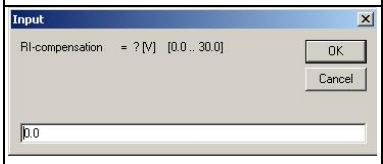
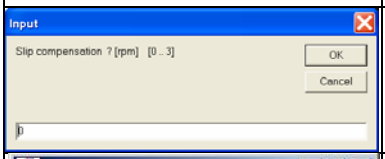
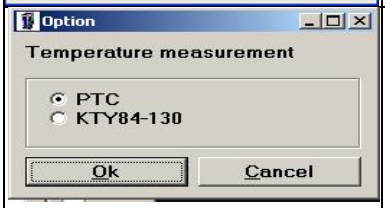
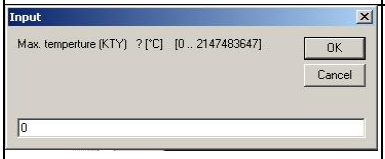
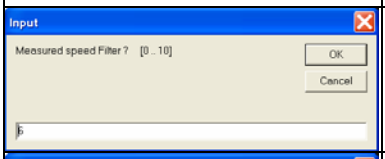
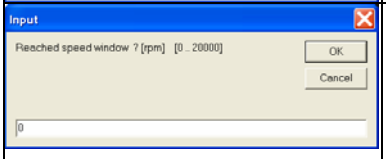
Parameter	Value	Unit
Number of poles	2	
Motor power	0.01	[kW]
Motor nom. Current (Inom)	0.1	[A]
Current accel/decel (Iacc)	0.1	[A]
Motor current (Iref)	0.1	[A]
Freq ctrl source	SERIAL	
Default frequency	0.00	[Hz]
Minimum frequency	0.00	[Hz]
Preset Frequency 1	0.00	[Hz]
Preset Frequency 2	0.00	[Hz]
Preset Frequency 3	0.00	[Hz]
Acceleration time min.	10.0	[s]
Deceleration time min.	10.0	[s]
Measure speed	encoder	
Nbre pulses/revol.	0	
Slip	0	[rpm]
If Im>Iref	ignore	
Tempo. Im>Iref	0.100	[s]
RI-compensation	0.0	[V]
Slip compensation	0	[rpm]
Temperature measurement	KTY84-130	
Max. temperture (KTY)	130	
Measured speed Filter	6	
Reached speed window	0	[rpm]

To change a parameter, just double click on the corresponding line

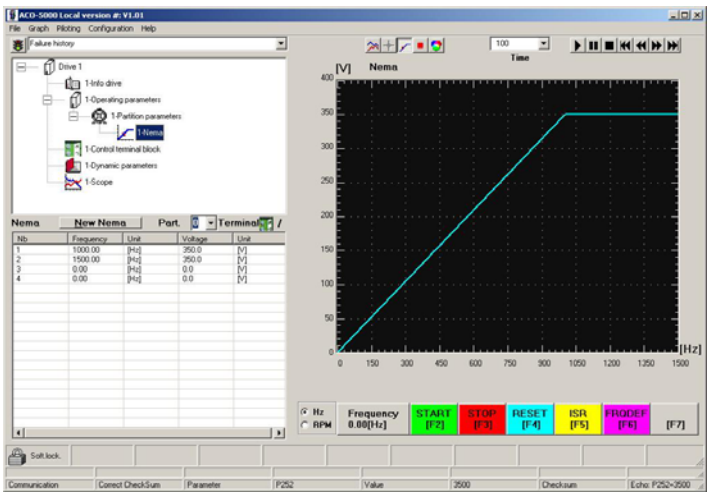
The default partition password is **acomel**

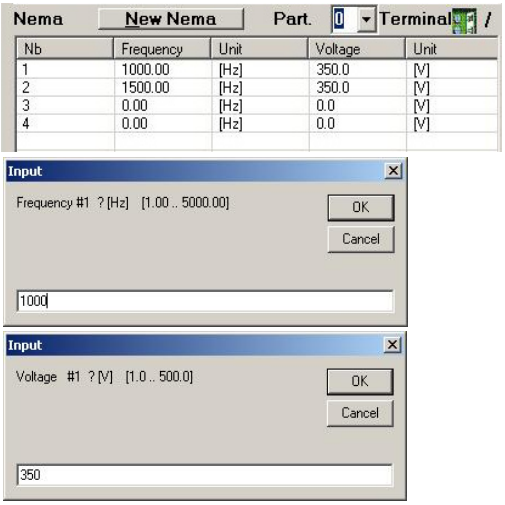
	This is the number of poles and not the number of pairs. It must be an even number. This value is shown on the motor plate and/or in the motor data sheet. Maximum number of poles: 2 - 1024
	Input here the power of the motor which will correspond to a 10 V signal when P_W is allocated to the analogue output A_OUT1 or A_OUT2
	Value in A. This input is use to check the setting of current related parameters as follow: **I_{REF}** ≤ 150% of I_{NOM} (motor reference current) **IFCC** ≤ 100% of I_{NOM} (DC current braking) **IFCP** ≤ 20% of I_{NOM} (DC continuous current braking) **IACC** ≤ 200% of I_{NOM} (Acceleration current max.)
	Set here the maximum allowed current during acceleration / deceleration. The limit value is 200% of **I_{NOM}** . The function **If I_m > I_{REF}:** is inhibited during acceleration and deceleration.
	Set here the maximum allowed current during operation. The limit value is 150% of **I_{NOM}** . This value is used dor the comparison **I_m > I_{REF}**
	Frequency control source. At this step you can set if you want to assign the output frequency of the drive, respectively the motor speed to the: o **SERIAL** means to USB or dedicated keypad TL5 o **T.BI.** i.e to the 0 to 10 V analogue speed reference input A_IN in the drive front or one of the 3 possible preset frequencies.

	In case of selection of the **Freq. ctrl source** selection from the **SERIAL** frequency control, the value entered or shown here will be taken as speed reference input when the inverter is being turned ON. In running mode you can record the actual value as default just by hitting the F6 key under the scope section. Here again, the input must be in Hz, input in RPM is not allowed and will lead to a mis-setting.
	Enter here the minimum frequency under which one you don't want to operate your motor.
	If you have selected the **Freq. ctrl source** from the **T.BL** you have the possibility to define up to 3 pre-set speeds. The selection of one of those pre-set speeds will be done applying +24V to the allocated terminal(s). If this feature has been activated and no selection made through terminals, the analogue reference input will be active. Here again, the input must be in Hz, input in RPM is not allowed and will lead to a wrong setting.
	The minimum **acceleration** time is set in seconds, between 0.1 to 512. This is the acceleration time needed to reach the full speed of the motor. If the set speed is the half of the full speed, the time to reach this speed will be the half of the acceleration set time. This value is a minimum and can't be reduced within the dynamic parameters.
	The minimum **deceleration** time is set in seconds, between 0.1 to 512. This is the deceleration time needed to reach zero speed from the full speed of the motor. If the set speed is the half of the full speed, the time to stop will be the half of the deceleration set time. This value is a minimum and can't be reduced within the dynamic parameters.
	This is only a speed measurement and not a speed closed loop. Our sensor input accepts: • Standard 5 V TTL encoder signals, 2 channels 90° phase shifted, with or without index. • Magneto-resistive sensor signal
	Enter here the number of pulses per revolution: Value: **0** to **65535**
	Using the speed feedback is it possible to monitor the slip of the motor and issue a signal when the slip exceeds a pre-set value. Input of the maximum slip in RPM
	Set the reaction of the drive when the motor current $I_M > I_{REF}$ • **trip** you will trip the drive • **dec** you will reduce the output frequency F_S to keep the motor current lower than the reference current • **ignore** the information. In this case the maximum current of the inverter will be available for the motor. The information that the current $I_m > I_{REF}$ can be allocated to one of the digital outputs OUT1 to OUT4

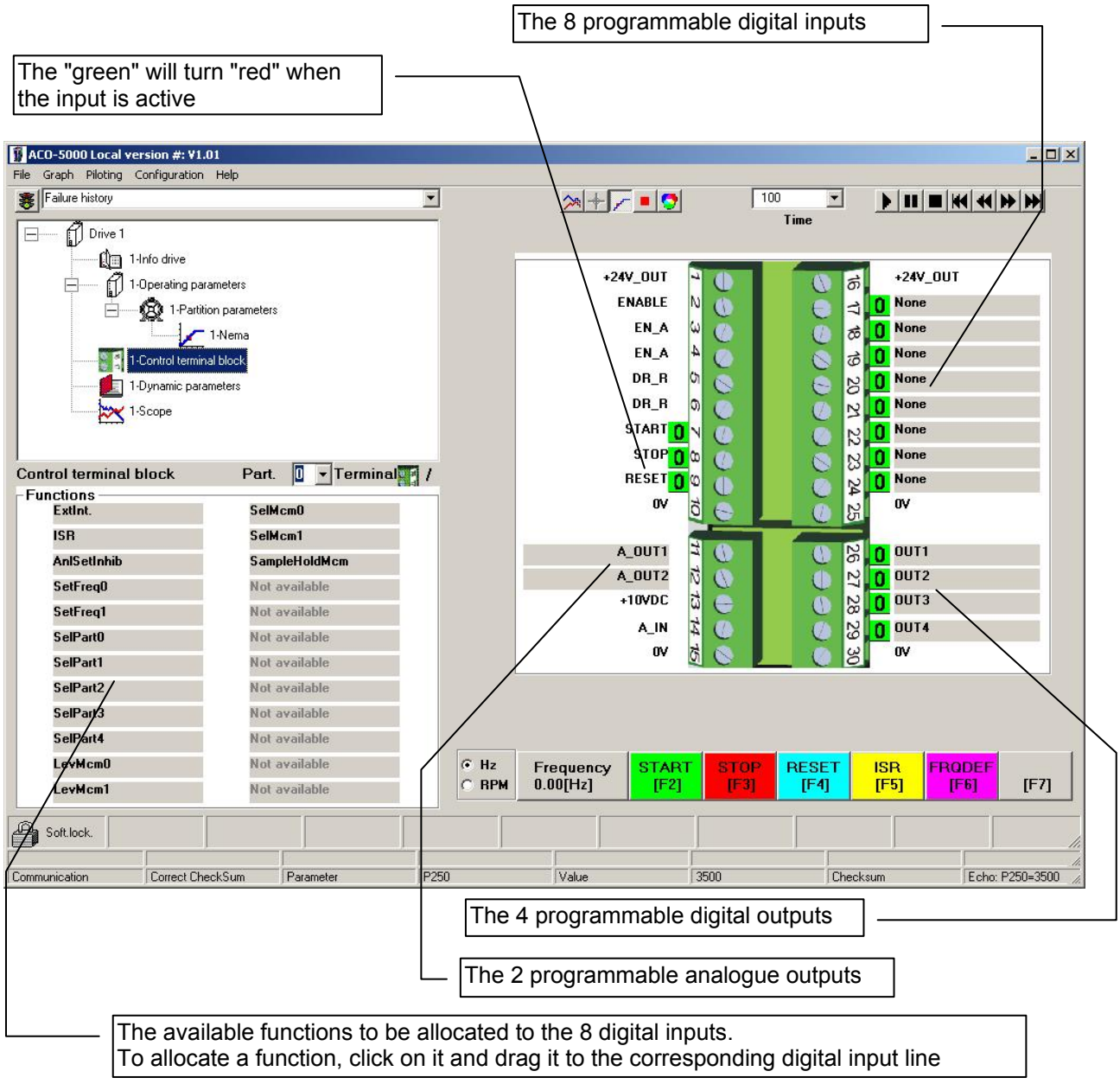
	This is the delay to activate $I_m > I_{REF}$ after the reach speed signal. This delay is used to wait that the speed has stabilized before $I_m > I_{REF}$ is activated.
	The resistance **R** of the motor winding is source of a voltage drop proportional to the motor current **I**. The **RI** voltage will be added to the output voltage U_S to obtain the nominal torque over the entire frequency range. This function is mainly used when operating at the lower part of the range. The value can be set between 0 and 30 V.
	Slip compensation. Enter here the slip at nominal current of the motor. A linear compensation based on the active current will be done.
	The temperature monitoring of your motor can be made, using a PTC or a KTY84-130. Please select here the temperature sensor integrated into your motor windings.
	If you have selected the KTY84-130, enter here the temperature value you want to monitor and trip or stop the drive.
	To stabilize the display of the speed you can here input a filter value.
	Setting **0 rpm**, the signal “reached speed” will be delivered at the end of the acceleration when the speed is over 95% of the set value. Setting an othe number of rpm will maintain the signal reached speed active so long the output speed remain in this window (positive or negative).

The Nema input





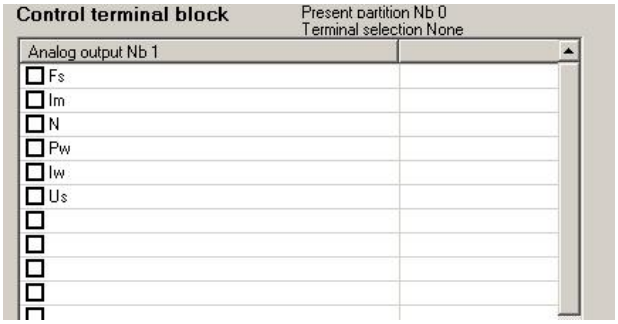
The control terminals allocation



The available functions for digital inputs

Functions to allocate	Comments on the allocated function
VerExt	External interlock
ISR	Reverse rotating direction
VerConsAn	Inhibit the speed reference analogue input
FreFix0	Fix frequency value 2^0
FreFix1	Fix frequency value 2^1
SelPart0	Partition selection value 2^0
SelPart1	Partition selection value 2^1
SelPart2	Partition selection value 2^2
SelPart3	Partition selection value 2^4
SelPart4	Partition selection value 2^5
NivMcm0	MCM level value 2^0
NivMcm1	MCM level value 2^1
SelMcm0	MCM selection value 2^0
SelMcm1	MCM selection value 2^1
SampleHoldMcm	Active the Sample & Hold reading

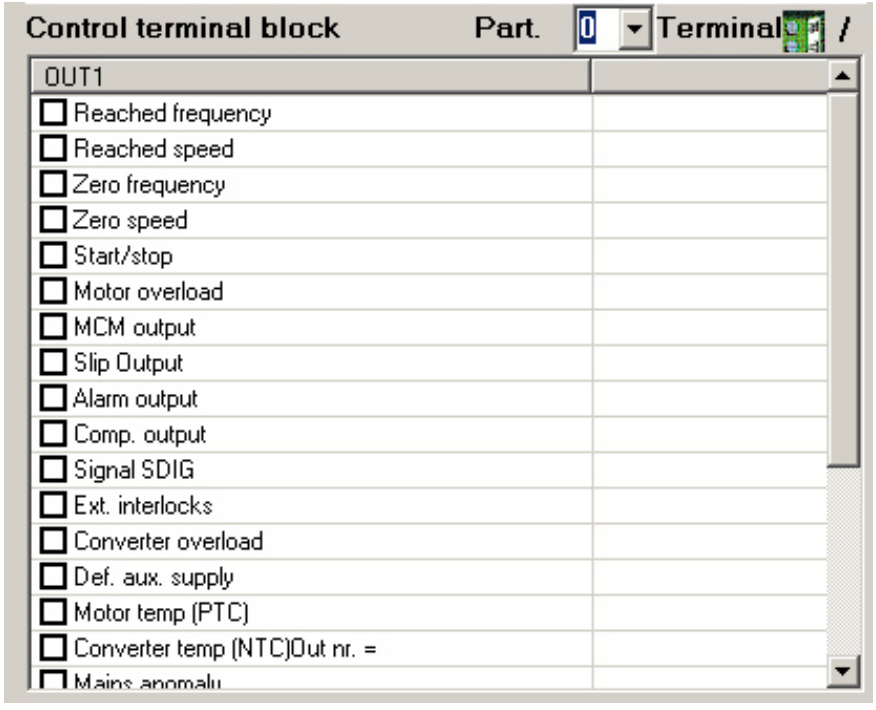
The analogue outputs allocation



The available parameters can be allocated either to A_OUT1 or to A_OUT2

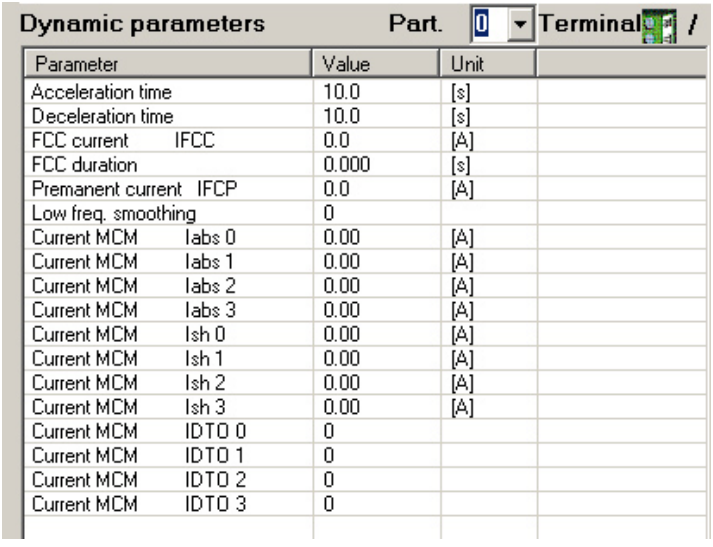
- **Fs** for the output frequency: 10 V = $\mathbf{F_{max}}$
- **Im** for the motor current : 10 V = 1.5 * $\mathbf{I_{NOM}}$
- **N** speed of the motor 10 V = $\mathbf{N_{MAX}}$
  need a speed feedback from the motor
- **Pw** active output power 10 V = $\mathbf{P_{MAX}}$ of motor
- **Iw** active output current 10 V = $\mathbf{P_{MAX}}$ **/** 1.28 $\mathbf{U_S}$
- **Us** for output voltage: 10 V = last $\mathbf{U_S}$ **/**$\mathbf{F_S}$ **Pt.**

The digital outputs allocation

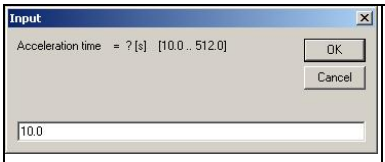
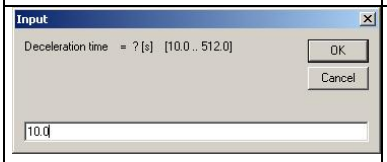
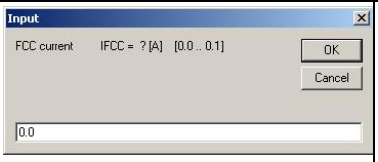
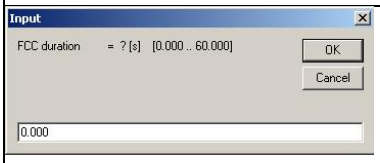
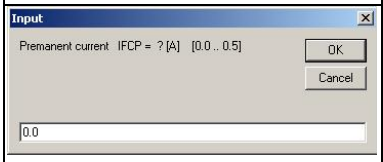
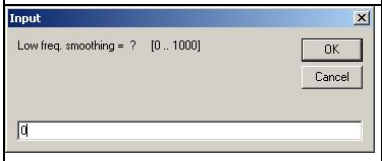
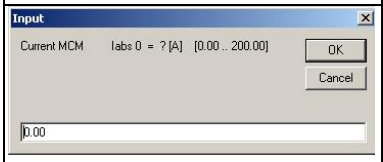
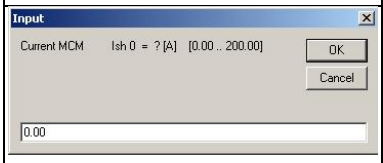
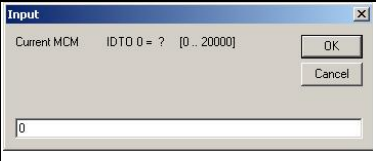


Functions to allocate	Comments on the allocated function
Reached frequency	The allocated output will turn ON as soon the output frequency of the converter is higher than 95% of the set value and after the MCM delay if a value has been programmed. The MCM delay ca be monitored from the CNC or PLC too.
Reached speed	The allocated output will turn ON as soon the measured motor speed 95% of the set value and MCM tempo as above. This function need a speed feedback from motor
Zero frequency	The allocated output will turn ON as soon the output frequency of the converter is under 0.5 Hz **This function is only active in STOP mode**
Zero speed	The allocated output will turn ON as soon the measured output speed is lower than 2 pulses / sec.. This function is active only in STOP status
Start/stop	The allocated output will turn ON as soon the converter is in START mode
Motor overload	The allocated output will turn ON as soon the motor current is higher than the reference current: $\mathbf{I_m > I_{REF.}}$ This choice is only possible if the condition “Ignore” or "trip" has been programmed.
MCM output	The allocated output will turn ON as soon the **MCM** condition is true.
Slip Output	The allocated output will turn ON as soon as the **SLIP** is higher than the programmed value. Need a speed feedback.
Alarm output	The allocated output will turn ON as soon as an **alarm** has been triggered. This function is used in combination with the delayed trip by non destructive failure
Comp. output	The allocated output will turn ON, after the programmed delay, when the analogue input exceed the programmed level.
Signal SDIG	Clock output corresponding to 6 time the output frequency
Ext. interlocks	The allocated output will turn ON as soon the external interlock circuitry is open.
Converter overload	The allocated output will turn ON if the output current exceeds the maximum current of the converter. This current value is shown in the **info drive** menu**.**
Def. aux. supply	In failure free status, the allocated output is powered ON
Motor temp (PTC)	The allocated output will turn ON if the motor temperature is to high
Converter temp (NTC)	The allocated output will turn ON if the heatsink temperature exceeds 70°C, tolerance ± 3°C..
Mains anomaly	The mains voltage is compared to the value entered in the operating parameters allocated output will turn ON if the mains voltage is out of the tolerance of 480 V+10 % respectively 200 V –15%.

The dynamic parameters

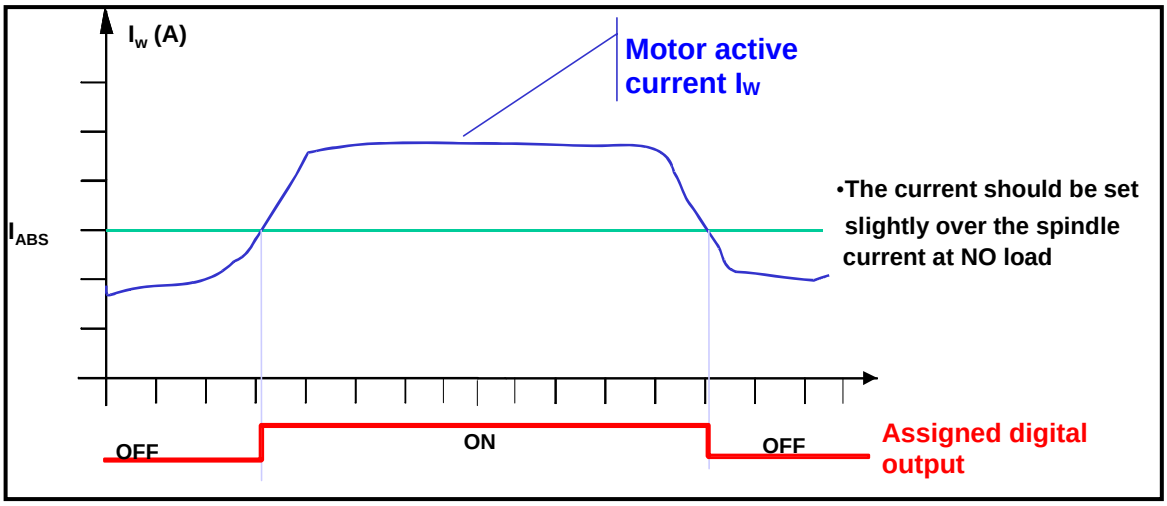


Parameter	Value	Unit
Acceleration time	10.0	[s]
Deceleration time	10.0	[s]
FCC current IFCC	0.0	[A]
FCC duration	0.000	[s]
Premanent current IFCP	0.0	[A]
Low freq. smoothing	0	
Current MCM Iabs 0	0.00	[A]
Current MCM Iabs 1	0.00	[A]
Current MCM Iabs 2	0.00	[A]
Current MCM Iabs 3	0.00	[A]
Current MCM Ish 0	0.00	[A]
Current MCM Ish 1	0.00	[A]
Current MCM Ish 2	0.00	[A]
Current MCM Ish 3	0.00	[A]
Current MCM IDTO 0	0	
Current MCM IDTO 1	0	
Current MCM IDTO 2	0	
Current MCM IDTO 3	0	

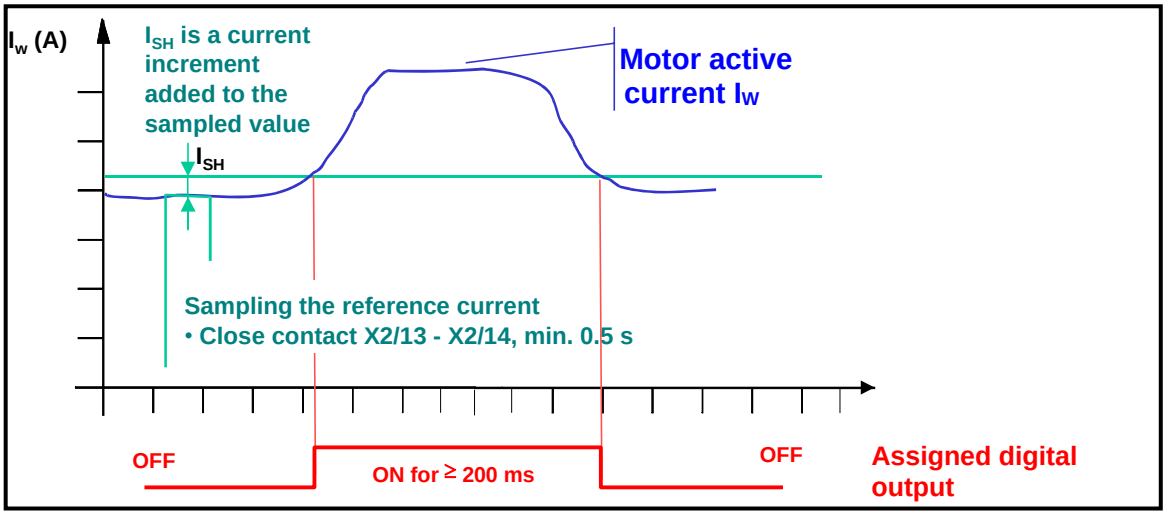
	The **acceleration** time is set in seconds, between 0.1 to 512. This is the acceleration time needed to reach the full speed of the motor. If the set speed is the half of the full speed, the time to reach this speed will be the half of the acceleration set time. This time must be ≥ as the minimum acceleration time set within the motor partition.
	The **deceleration** time is set in seconds, between 0.1 to 512. This is the deceleration time needed to reach zero speed from the full speed of the motor. If the set speed is the half of the full speed, the time to stop will be the half of the deceleration set time. This time must be ≥ as the minimum deceleration time set within the motor partition.
	Value of the DC injected braking current. IFCC should not be higher than the nominal current of the motor. This function, when activated, is automatically initiated after a STOP command, when the intermediate DC- bus reaches is ≤ 35 VDC.
	DC braking current duration
	Value of the permanent injected DC braking current. This function is used when the motor needs to be braked (holding torque) at standstill, for example to keep air bearing spindle from rotating at stop. We suggest setting this current not higher than 20% of the motor nominal current.
	Low frequency smoothing factor, to be used only in case of instability at low frequencies.
	Set here the absolute reference value to which the motor current must be compared to trigger the allocated output. This value is in A. For one partition, 4 values can be entered.
	The value to set here is the sensitivity of the SH monitoring. The value set is the current increase (A) versus the recorded one, which will trigger the corresponding output. At the releasing of the allocated digital input, the instant value of I_m is recorded. As soon the motor current exceed "***the recorded I_m + I_{SH}***", the allocated output will be triggered. For one partition, 4 values can be entered.
	Enter here the dynamic sensitivity factor, value between 0 to 20 000. Higher is the factor, lower is the sensitivity. The allocated output will turn ON for approximately 200 ms. For one partition, 4 values can be entered.

The MCM function – Gap eliminator

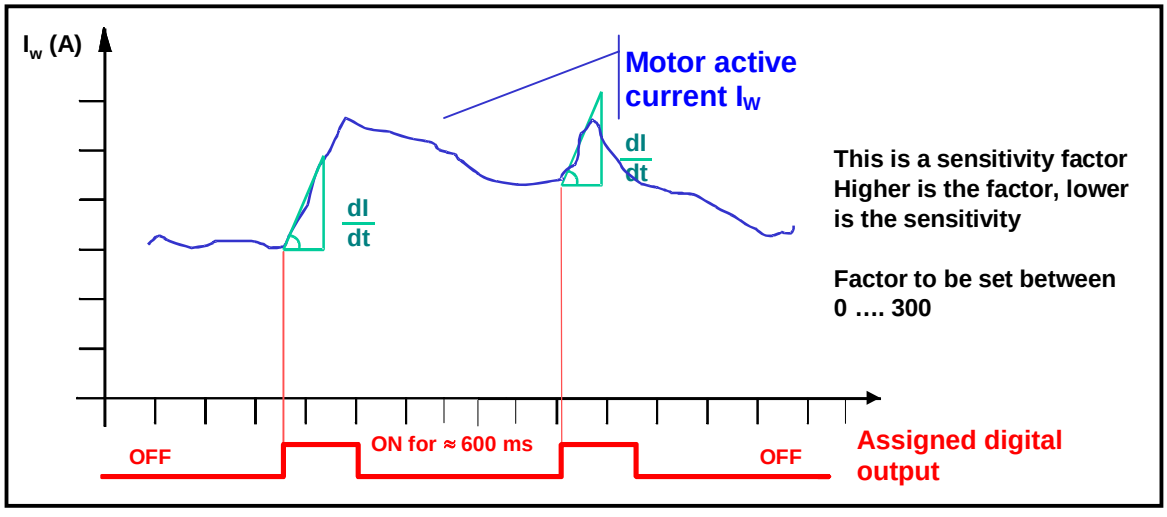
1. Based on an absolute reference



2. Based on the Sample & Hold reference


I_w (A)
I_{SH} is a current increment added to the sampled value
I_{SH}
Motor active current I_W
Sampling the reference current
• Close contact X2/13 - X2/14, min. 0.5 s
OFF
ON for ≥ 200 ms
OFF
Assigned digital output

3. The IDTo based on a dynamic sensing of the current variations



How to ensure the best sensitivity and take advantage of the 4 sensitivity levels of each MCM

The CNC controller should start to process the information delivered by the allocated relay only when the grinding wheel is close to the part and the cooling media already ON. In other words: as close as possible from the machining process and after having activated the inhibition of the analogue reference input via one of the terminal bloc digital input.

The **Gap Eliminator** sensitivity level is limited by the variations of the motor active current before the machining process starts. The main source of such variations is the analogue speed reference input that can be affected by inducted disturbances. A proper shielding and grounding of the connecting cable can reduce those disturbances. The ACO5000 frequency inverter offers a great solution to this problem. A digital signal, coming from the CNC controller, can be used to inhibit the analogue speed reference signal during machining (see "AnlSetInhib" function to allocate to terminal block).

Up to **4 sensitivity levels** can be set for each motor partition. They could be used for example:

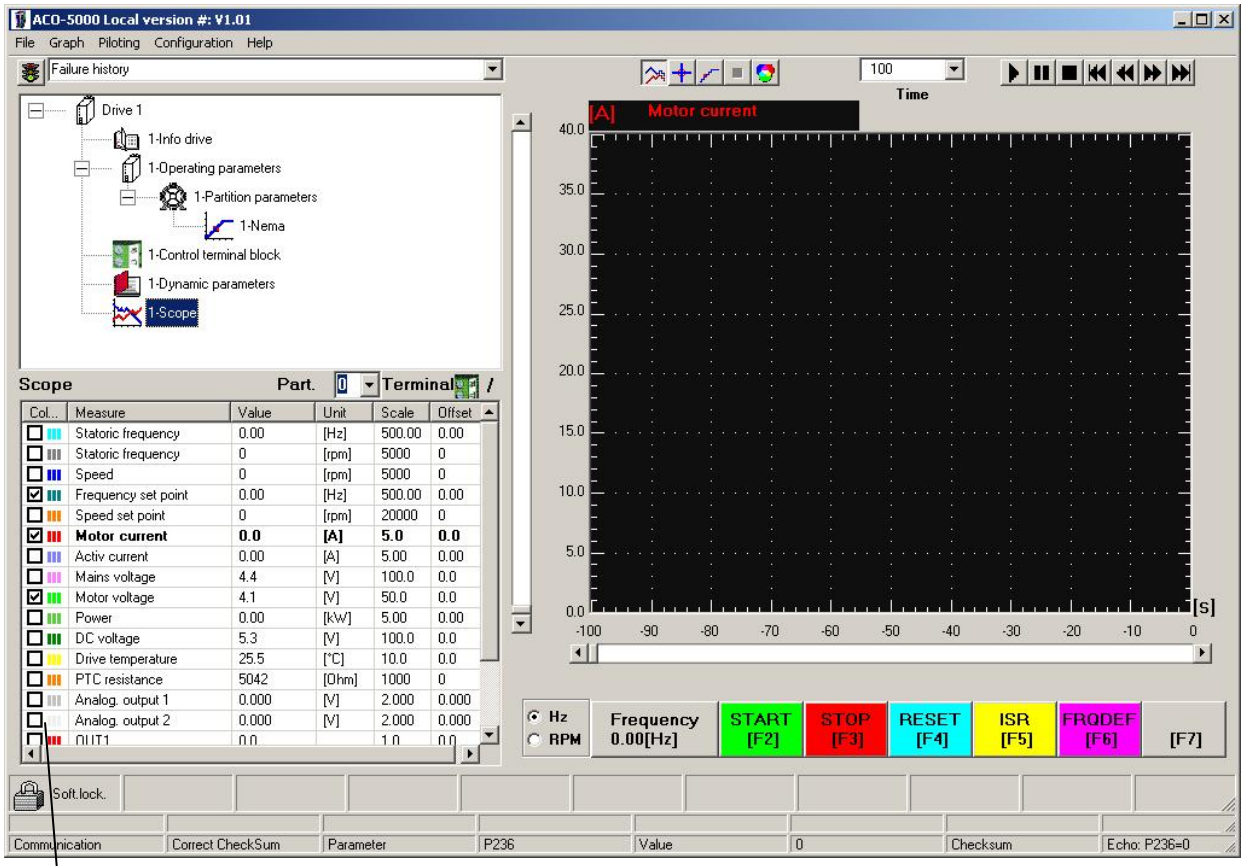
- To differentiate between various grinding wheels of work process
- As crash protection during the machining process. Using the ABS or IDTO, the relay will pull any time the set value is true. You will use here the highest possible sensitivity for the **Gap Eliminator** function and a higher value to detect a possible crash. The selection of the active level can be monitor by the CNC via the terminal block.

NOTE: The selection of the MCM type and the MCM level can only be made via the terminal block. The selection of the type is by the allocation of "SelMcm0" and "SelMcm1" and the selection of the level is made by allocation of "LevMcm0" and "LevMcm1" as follow:

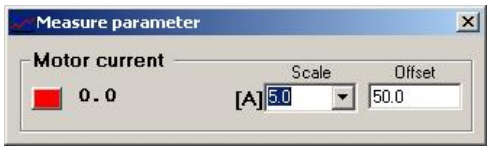
Selection of the MCM type			Selection of the MCM level		
SelMcm0	SelMcm1	Type	LevMcm0	LevMcm1	Level
0	0	Abs (default)	0	0	1 (default)
1	0	SH	1	0	2
0	1	IDTO	0	1	3
1	1	Not allocated	1	1	4

* Value "1" is made by applying +24VDC to the corresponding digital input.

The scope function

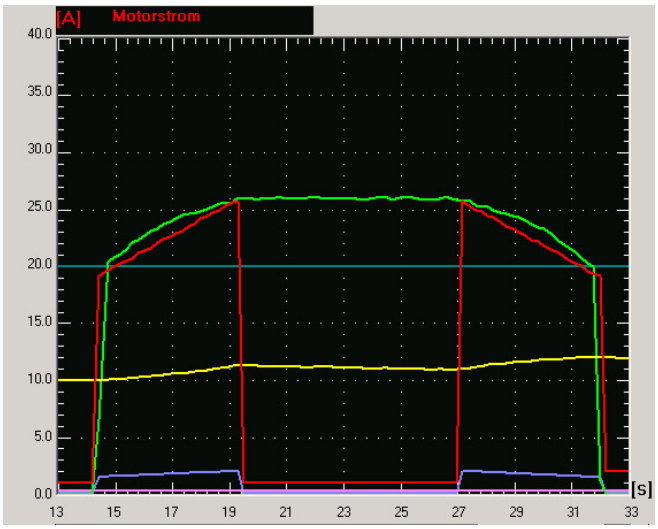


The list of the available parameters for the scope function. Select a parameter by just clicking in the selection box



For each parameter, you have the possibility to set the scale, the offset and the color of the ligne. Just double click on it to access this window.

Note: All 19 above parameters are continuously recorded. Even if you decide to show only few of them on the screen, you can, at any time, add other ones and have them displayed from the recorded data set. The recording file is maximum 12 MB i.e. 2 hours of recording. If the time exceed 2 hours, just le last 2 ones are recorded (ring buffer)



NOTES

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